

**PRE-CONDITIONED SOLUTE FOR USE
IN CRYOGENIC PROCESSES**

ABSTRACT OF THE DISCLOSURE

Embodiments of the present invention disclose methods for producing pre-
5 conditioned solutes that exhibit no temperature spike during super-cooling in a cryogenic
process. In addition, the solutes demonstrate utile capabilities and characteristics such
as more efficient heat absorption rates and eutectic material properties which make the
pre-conditioned solutes an efficient heat exchange medium. The methods involve super-
cooling a solute to induce a long-duration phase change capability. The pre-conditioned
10 solute may be thawed and will retain long-duration phase change capabilities for
subsequent freezing cycles if the freezing protocols disclosed herein are followed.
Material to be frozen may be directly immersed into pre-conditioned, super-cooled
solute for freezing. The solute may be propylene glycol, glycerol, or other suitable
solute.